

ENALLAGMA WESTFALLI, A NEW DAMSELFLY FROM EASTERN TEXAS, WITH REMARKS ON THE GENUS TELEALLAGMA KENNEDY

(ODONATA: COENAGRIONIDAE)

THOMAS W. DONNELLY, *Dept. of Geology, Rice University, Houston, Texas*

During the spring of 1962 and again in 1963 the writer collected in eastern Texas eleven males, eleven females, and a few nymphs of a remarkable new species of *Enallagma*. This species is most closely related to *E. pallidum* Root 1923 and *E. dacckii* (Calvert) 1903, and its discovery further indicates the close relationship between *E. dacckii* and other species of *Engallagma* which was first discussed by Byers (1927).

***Enallagma westfalli* n. sp.**

Holotype male. Head.—Pale blue, black as follows, medial spot, and lateral basal spots on the labrum; lateral spots on postclypeus; antennae, except for venter of first segment; crescentic medial stripe on frons; dorsum of head, except for large postocular spots, which are not connected to the medial pale stripe posterior to the vertex, and irregular pale T-shaped spot on vertex, extending laterally toward antennae.

Prothorax.—Pale blue with two pairs of black stripes on medial lobe, the dorsal of which extends anteriorly to the fore lobe and posteriorly to the base of the hind lobe, stretching thence to the mid-dorsal carina. Ventral lateral black stripe less prominent. Margin of hind lobe entire.

Pterothorax.—Almost entirely pale blue with very thin black line on mid-dorsal carina; thin black line on antehumeral suture expanded into a small black spot posteriorly; black line posterior to mesostigmal laminae; small dorsal black spot on mesinfraposternum, and another on antero-dorsal portion of mesepimeron; very thin, short black stripes posteriorly on first and second lateral sutures. Pale brown stripe on mesepisternum adjacent to mid-dorsal carina, grading into a small black spot posteriorly.

Legs.—Pale, black as follows: dark stripes on dorsal surface of femora, expanded apically; thin stripes in tibiae, confined in last two pairs of legs to short proximal internal stripes. Faint suggestion of apical ringing on interior surfaces of hind femora. Black femoral and tibial spines, and tips of tarsal claws black. The holotype male lacks one set of fore tarsi, and has the other set incompletely developed.

Wings.—Venation brown. Fore and hind wings petioled proximal to *ac*; *Rs* arising about 0.2 mm. from *M*₃ in fore wing and 0.25 mm. in hind wings, forming a narrow, subparallel-sided cell.

Abdomen.—Pale blue, black as follows: antero-dorsal spot and small postero-lateral spots on 1; dorsal stripe expanded posteriorly to maximum width one-quarter from apex of the segment, thence narrowed abruptly apically, on 2; dorsal stripes on posterior nine-tenths of 3 to 6, narrowed anteriorly and expanded posteriorly, narrowing abruptly at apex of segment; dorsal stripe extending entire length of 7, narrowed anteriorly and expanded posteriorly; dorsal stripe on 10 expanded posteriorly to form rounded, T-shaped spot.

Appendages.—Superior appendage black, forked. Superior arm prominent, hooked slightly in dorsal and lateral view. Inferior arm spatulate in dorsal view,

extending medially beyond centerline of insect, with a small apical tubercle on dorsal surface. Inferior appendage typical for genus, not distinctly hooked in either view, pale except at tip.

Genitalia. Penis with third segment expanded at tip to form rounded, T-shaped tip. Lateral lobes of third segment prominent, typical for majority of genus.

Variation among paratype males.—The extent of dark color is variable in males of this species. The holotype male represents nearly the maximum extent of dark color on the head (Pl. II, fig. 1), and the paratype figured (Pl. II, fig. 2) is among the palest. Seven paratypes lack the small posterior black spots on the mesepisternum. Only in the holotype and one paratype is the dorsal spot on 10 interrupted anteriorly to form a T-shaped spot, though in another paratype there is a small pale antero-lateral spot included within the black on one side of the segment. Three paratypes have the dorsum of 10 pale; the remainder are totally dark. The origin of R_s is highly variable, ranging from about 0.1 to 0.3 mm. from M_s in fore wings and from 0.2 to 0.6 mm. in hind wings. The petiole is clearly proximal to ac in all but one paratype, which has one wing petioled to ac and another very close to ac .

Allotype female.—Differs from the male as follows: Dorsum of head paler and very similar to that of palest paratype male (pl. II, fig. 2). Pterothorax pale except for black on and posterior to mesostigmal laminae; very thin black line on mid-dorsal carina, and on posterior portion of antehumeral suture. Segment 8 with dorsal spot on basal third, narrowed posteriorly. Dorsum of 10 pale. Legs with outer edges of femora pale, dividing the black into longitudinal stripes. Hind femora very faintly ringed apically.

Mesostigmal laminae well developed, expanded laterally with prominent ventral margin and excavated anterior surface, with lobate antero-lateral corners. Venter of segment 8 with spine.

Wings as in male, R_s 0.25 mm. from M_s in fore wing and 0.25 mm. in hind wing. Wings not petioled to ac .

Variation among paratype females.—Extent of black on dorsum of head variable, though less so than in males, with allotype representing the mean. One female has the black stripe through the median ocellus extending behind the bases of the antennae. Three females have the spot on 8 reduced to the basal quarter, three have a tiny spot extending only one-sixth, and two females have this spot lacking.

Measurements.—Male abdomen 25 to 26 mm. (holotype 25 mm.); hind wing 16 to 16.5 mm. (holotype 16 mm.). Female abdomen 25.5 to 27 mm. (allotype 26 mm.); hind wing 17.5 to 18.5 mm. (allotype 17.5 mm.).

Nymph.—The following notes are based on two mature and two immature exuviae. Because of the poor condition of the material, a complete description will not be given. The nymph differs from all others in the genus by its prominent dorsal tibial dark stripes, which extend the length of each leg. The mental setae number 2-3; the lateral setae 4-5. The dorsum of the head resembles that of *pallidum* and a number of other species in the genus, and has the rear corners more prominent than *daveckii*. The legs, in addition to the tibial stripes, have femoral ante-apical rings. Lateral keels are present on abdominal segments and have a few setae at the tip. The gills are variable, possibly because of varying degrees of regeneration shown. Juvenile specimens have the gills of slender, acuminate shape typical for genus, dark to nodus (about $\frac{3}{4}$ of length). Mature

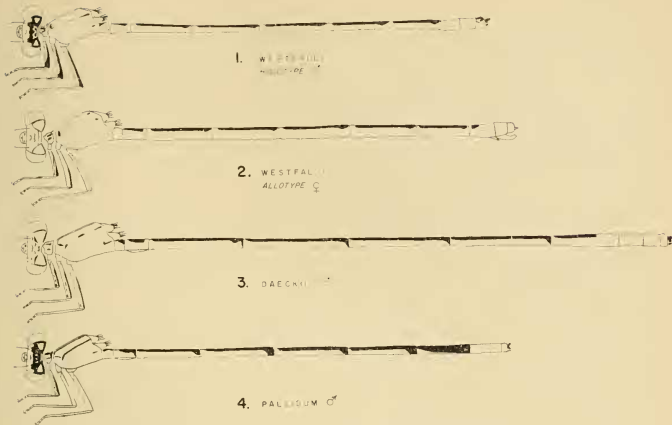


Plate I

Color patterns: fig. 1, *E. westfalli*, holotype male; fig. 2, *E. westfalli*, allotype female; fig. 3, *E. dacckii* (Texas), male; fig. 4, *E. pallidum*, topotype male.

specimens have gills about 6 mm. long, dark to nodus ($\frac{1}{2}$ of length), and with a dark band at tip. The gills of *dacckii* are wider, with pigment confined to thin patches along trachea. Those of *pallidum* are similar to *westfalli*, with pigmentation to nodus and small blotches of pigment in apical pale portion.

Related species.—The extremely reduced black coloration, the form of the male appendages, and the form of the penis relate this species to *E. dacckii* and *E. pallidum*. The three species are easily distinguished from one another. The male of *westfalli* has the dorsum of segments 8 and 9 pale, whereas *dacckii* has the apical third of 7 to 10 pale and *pallidum* has 8 to 10 pale. The superior appendage of the males (pl. II, figs. 8-13) are very distinctive; indeed these species display the greatest degree of innovation for North American species in the genus. The mesostigmal laminae of the females (pl. II, figs. 5-7) are analogous to the appendages of the males. Those of *dacckii* are the smallest and those of *westfalli* the largest. The laminae of *pallidum* are intermediate in size, and there are present on the anterior portion of the mesepisternum a pair of small pits, presumably to accommodate the pointed dorsal tips of the male appendages during mating. The female abdominal patterns are less distinctive than those of the male: the apical two-thirds of 8 to 10 is pale in *westfalli* and *pallidum*, but the pale color is restricted to 9 and 10 in *dacckii*. Many *westfalli* have segment 8 nearly entirely pale. The variable head color of *westfalli* makes this character of doubtful value, though I have found no overlap between *dacckii* (the palest), *westfalli*, and *pallidum* (the darkest) (pl. II, figs. 1-4).

In 1920 Kennedy erected the genus *Telcallagma* for Calvert's *Telagrion dacckii*. The new genus was characterized by a pair of subdorsal, apical points widened into small lateral lobes on segment 10, by a very slender abdomen, and by petiolation of the wing to *ac*. Curiously, Kennedy did not comment on the distinctive form of the male penis, of which organ he had made copious and exhaustive investigations in the preceding years in nearly all zygopteran groups. Garman (1927) further noted that in *Telcallagma* the vein Cu_2 terminated proximal to the origin of M_2 , whereas in *Enallagma* the termination was at or distal to the origin of this vein.

Root (1923) noted that his new species *pallidum* resembled *dacckii* in general appearance, but he elected to place it in *Enallagma* because of its small size, because of the resemblance of its appendages to those of *E. antennatum* (Say), and because of its general resemblance to *E. traviatum* Selys. Byers (1927) discovered *pallidum* in Florida, and he proposed that it was congeneric with *dacckii* and with other *Enallagma* on the basis of general appearance, size (Florida *pallidum* approach *dacckii* in size), the proximate origin of R_s and M_3 in *pallidum* and *dacckii*, the petiolation of the wings to *ac* in these two species, and the resemblance of the male appendages and the nymphs of *pallidum* and *antennatum*. Byers did not comment on the subdorsal apical lobes on 10, which are better developed in *pallidum* than in *dacckii*. Byers has stood virtually alone in his abandonment of the name *Telcallagma*, but the discovery of *westfalli* supports his views.

The relatively small number of the three species that I have examined have shown that venational characters are variable and of doubtful value for generic criteria. One specimen of *dacckii* before me has all four wings clearly petioled proximal to *ac*, and in three more specimens the petiolation is variable or unclear. In seven *pallidum* before me (including six from Florida) none have the wings petioled to *ac* (*pacc* Byers). One *westfalli* has two wings clearly petioled to *ac*. The origin of R_s is variable but in all three species tends to be closer to M_3 than in other *Enallagma*. All of the present specimens of *dacckii* and to topotype of *pallidum* have Cu_2 clearly terminating proximal to M_2 .

The penis of *westfalli* (pl. II, figs. 14, 15) is very similar to that of *traviatum*. A study of the penes of *Enallagma* (Donnelly, 1963) has shown that there is a rather uniform sequence of penis types from *E. praerarum* (Hagen) to *E. traviatum* to *E. westfalli* to *E. pallidum*

Figs. 1-4, dorsum of head: fig. 1, *E. westfalli*, holotype male; fig. 2, *E. westfalli*, paratype male; fig. 3, *E. dacckii* (Texas), male; fig. 4, *E. pallidum*, topotype male. Figs. 5-7, mesostigmal laminae of females (color pattern shown on left side; structure on right): fig. 5, *E. westfalli*, allotype; fig. 6, *E. dacckii* (Texas); fig. 7, *E. pallidum* (Florida). Figs. 8-13, male superior appendages, dorsal and lateral views: figs. 8, 11, *E. westfalli*, holotype; figs. 9, 12, *E. dacckii* (Texas); figs. 10, 13, *E. pallidum*, topotype. Figs. 14-19, penes, medial and lateral views, figs. 14, 15, *E. westfalli*, paratype male; fig. 16, 17, *E. dacckii* (Maryland); figs. 18, 19, *E. pallidum* (Florida).

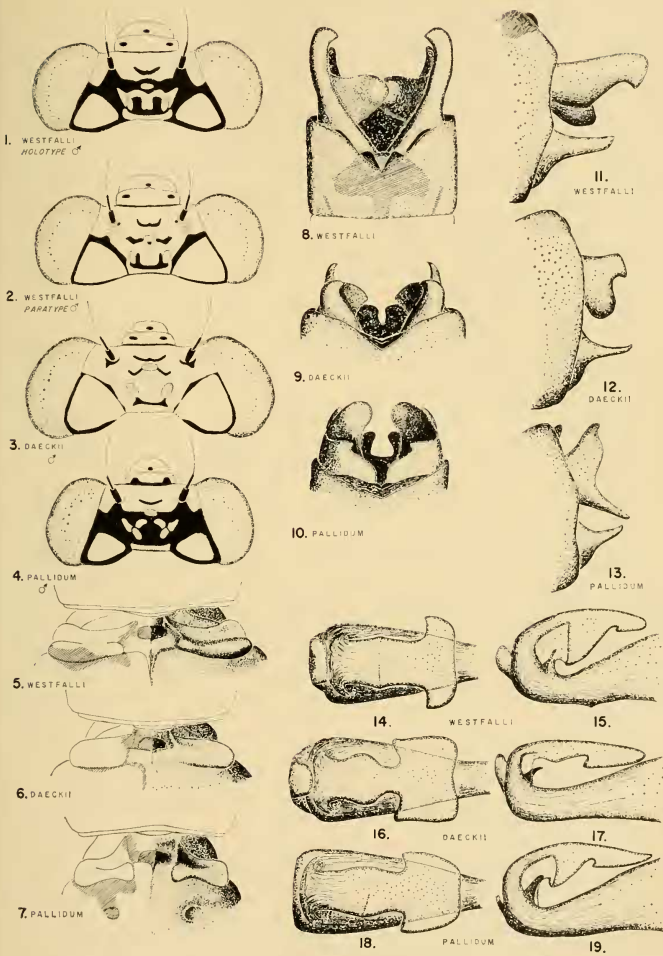


Plate II

to *E. dacckii*. The sequence is distinguished by decrease in hooking of the terminal lobes of the third segment and by decrease in size of the lateral lobes of this segment. The species *E. anna* Williamson, *E. semicircularis* Selys, and an undescribed species from Guatemala have penes which are very similar to those of *E. pracvarum*, and the penis of *E. aspersum* (Hagen) is very similar to that of *E. traviatum*. The sequence of penis types is paralleled by a decrease in dark coloration in the imagoes.

Clearly *westfalli* is congeneric with *traviatum* and equally clearly with *pallidum* and *dacckii*. The *westfalli-pallidum-dacckii* group shows striking innovations in the male appendages, nymph, and coloration, but there is no good criterion to separate these species from the remainder of the species in *Enallagma*. The name *Telecallagma* may be abandoned as a generic name, but it may be used as a subgenus, defined as follows:

Subgenus **Telecallagma** Kennedy 1920

Dark stripes on the pterothorax reduced to very thin lines or wanting; male superior appendages forked, with the inferior arm well developed and extending medially into a subhorizontal position; subdorsal apical lobes present on segment 10; penis with terminal lobes of third segment extended laterally, but not prominently hooked; *Rs* generally originating proximate to *Ms*, forming a cell with subparallel sides. Type species: *Telegrion dacckii* Calvert 1903. Other species: *Enallagma pallida* Root 1923, *E. westfalli*, new species.

Material examined.—All specimens of *E. westfalli* were collected at a small pond one-half mile west of Cleveland, Liberty County, Texas. Holotype male: 20 May 1962. Allotype female: 27 May 1962. Paratypes (ten males, ten females) also collected on these dates and on 3 June 1962 and 26 May 1963. A few nymphs collected during April 1963 emerged the first week of May. Additional specimens were seen on 12 May 1963. The holotype and allotype will be deposited in the collection of the University of Florida. Paratypes will be deposited in the collections of the U.S. National Museum and in the Williamson collection in Ann Arbor (University of Michigan Museum of Zoology). The remaining paratypes will be distributed among various collections.

E. dacckii.—Three males and two females, Fruitland, Wicomico Co., Maryland, Coll. T. Donnelly 15 June 1954; two males and two females, Merchants Mill, Gates Co., North Carolina, Coll. G. H. Beatty III, 28 June 1951; two males reared, Power House Dam Lake, Chattahoochee, Florida, Coll. M. Westfall, April 1956 and 1957; one male and female, Splendor, Montgomery Co., Texas, Coll. T. Donnelly, 6 May 1962.

E. Pallidum.—One male (topotype), Fruitland, Wicomico Co., Maryland, Coll. G. H. Beatty III, 4 July 1946; two males reared, Power House Dam Lake, Chattahoochee, Florida, Coll. M. Westfall, April 1955; one male and one female in cop., Nassau Co., Florida, Coll. M. Westfall, 7 June 1940; three females, Seminole Co., Florida, Coll. M. Westfall, 3 May 1941.

Habits.—The new species is remarkable among *Enallagma* for its tendency to fly predominantly in the shade. It is not especially active in the late afternoon (when *E. signatum* (Hagen) is abundant) but is found during the hottest part of the day lurking in shady places along the steep, brush-covered bank of the pond. The pond itself is not especially attractive for Odonata, and only a limited variety of dragonflies, chiefly libellulines and coenagrionines, but including a few cordulines, aeshnines, and gomphines, occur here. The most abundant damselflies are *Argia apicalis* (Say), *Ischnura ramburii* Selys, and *Enallagma exulans* (Hagen) and *signatum* (Hagen). *Ischnura posita* (Hagen) and *Enallagma basidens* Calvert are less common.

The pond has no unusual physical or biological characteristics. The sides are steep, and emergent vegetation is sparse. Though the water was always very muddy, there was no particular reason to suspect pollution.

Acknowledgment.—I am grateful to Dr. Minter Westfall for the loan of some specimens and the gift of others used in this study. My dedication of this species to Prof. Westfall is but a small tribute to his position among workers in this order, and but insufficient recompense for many kind favors extended me over many years.

REFERENCES

- Byers, C. F. 1927. *Enallagma* and *Tetagrion* from western Florida, with a description of a new species. *Ann. Ent. Soc. Amer.*, 20: 385-392.
- Donnelly, T. W. 1963. Possible phylogenetic relationships among North and Central American *Enallagma*. *Proc. North Central Branch, Ent. Soc. Amer.* 18: 116-119.
- Garman, P. 1927. The Odonata or dragonflies of Connecticut. *State Geological and Natural History Survey, Bull.* 39.
- Kennedy, C. H. 1920. Forty-two hitherto unrecognized genera and subgenera of Zygoptera. *Ohio Jour. Sci.* 21: 83-88.
- Root, F. M. 1923. Notes on Zygoptera (Odonata) from Maryland, with a description of *Enallagma pallidum*, n. sp. *Ent. News*, 34: 200-204.